

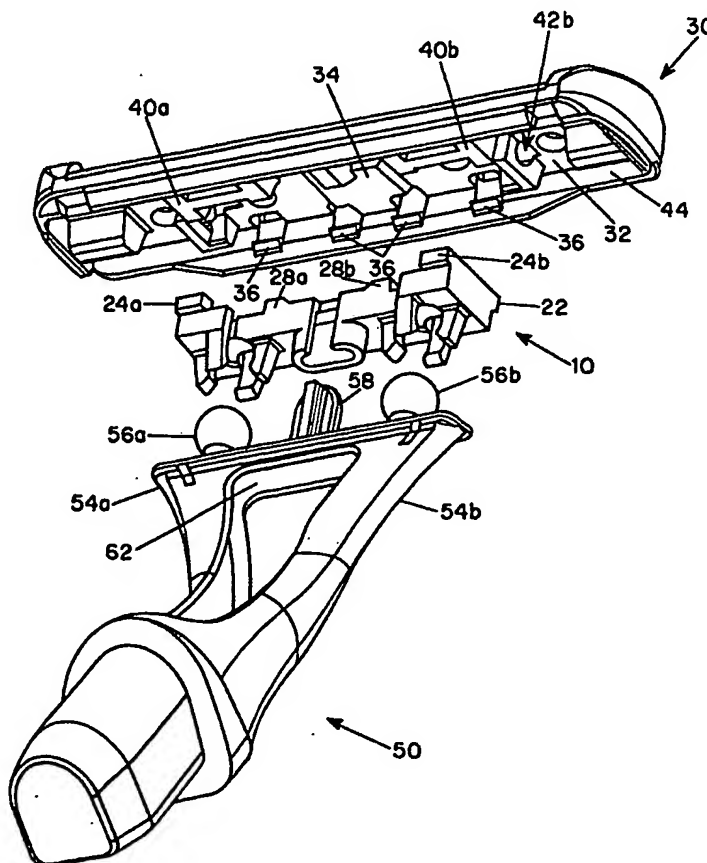
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(54) Title: ADAPTER UNIT FOR A SHAVING RAZOR

(57) Abstract

There is disclosed a razor cartridge (10 & 30) for use with a razor handle (50) having a handle engagement member (56a & 56b and 58) extending from one end thereof. The razor cartridge comprises a razor blade carrier (30) having a carrier engagement member (36) thereon and an adapter unit (10) having a first side (14b) and a second side (14a). The first side (14b) of the adapter unit (10) has an adapter engagement member (24a & 24b) lockingly mateable with the carrier engagement member (36) with at least one of the adapter engagement member (24a or 24b) and the carrier engagement member (36) being resiliently yieldable, such that the adapter engagement member (24a & 24b) and the carrier engagement member (36) may be snapped into non-detachable engagement with each other. The second side (14a) of the adapter unit (10) has means (16a & 16b) for attachably mating the razor cartridge (10 & 30) with the handle engagement member (56a & 56b).



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ADAPTER UNIT FOR A SHAVING RAZOR

BACKGROUND OF THE INVENTION

The present invention relates to the construction of shaving razors, in which an adapter unit provides an interface between a razor blade carrier and a razor handle

5 engaging member.

A manufacturer of shaving razors may manufacture shaving razors of a wide variety of designs. In particular, many designs have been developed with respect to the interconnection of razor blade carriers and razor handles. In many circumstances, it would be advantageous for a manufacturer to be able to use razor blade carriers and razor

10 handles of various designs together.

For example, for the sake of manufacturing efficiency, it would be advantageous for a manufacturer to be able to use a standardized razor blade carrier with multiple razor handle designs or a standardized razor handle with multiple razor blade carrier designs. In addition, it would be commercially attractive for a manufacturer to produce a

15 standardized razor handle that would be compatible with various commercially available razor blade carrier designs. In addition, it would be advantageous for a manufacturer to be able to use new razor handle designs with older razor blade carrier designs to extend the life of the older razor blade carrier designs. Furthermore, it would be advantageous for a manufacturer to use new razor blade carrier designs with older razor handle designs

20 to facilitate the transition to new razor blade carrier designs.

Accordingly, there exists a need for a device and method for allowing razor blade carriers and razor handles of various designs to be used together.

SUMMARY OF THE INVENTION

In accordance with a preferred embodiment of the present invention, there is

25 provided a razor cartridge for use with a razor handle having a handle engagement

member extending from one end thereof. The razor cartridge includes a razor blade carrier having a carrier engagement member thereon, and an adapter unit having a first side and a second side. The first side of the adapter unit has an adapter engagement member that is lockingly mateable with the carrier engagement member. At least one of the adapter engagement member and the carrier engagement member are resiliently yieldable, such that the adapter engagement member and the carrier engagement member may be snapped into non-detachable engagement with each other. The second side of the adapter unit has means for attachably mating the razor cartridge with the handle engagement member.

Advantageously, with the adapter unit of the present invention, a manufacturer of shaving razors may mass produce a standardized razor blade carrier for all of its various models of shaving razors, and use different adapter units to adapt the standardized razor blade carrier to different designs of razor handle engagement members. Since the economies of scale of mass producing the standardized razor blade carrier will typically outweigh the added cost of producing the relatively simple adapter unit of the present invention, a manufacturer may reduce its overall costs of manufacturing different razor designs.

The carrier engagement member of the razor cartridge may comprise one or more claws, and the adapter engagement member may comprise an elongated projection.

Alternatively, the carrier engagement member may comprise one or more slots, and the adapter engagement member may comprise one or more tabs.

In another preferred embodiment of the present invention, there is provided a razor cartridge for use with a razor handle having a handle engagement member extending from one end thereof. The razor cartridge includes a razor blade carrier having a carrier engagement member thereon, and an adapter unit having a first side and a second side. The first side of the adapter unit has a first adapter engagement member lockingly mateable with the carrier engagement member, with at least one of the first adapter engagement member and the carrier engagement member being resiliently yieldable, such that the first adapter engagement member and the carrier engagement

member may be snapped into non-detachable engagement with each other. The second side of the adapter unit has a second adapter engagement member pivotably mateable with the handle engagement member, at least one of the second adapter engagement member and the handle engagement member being resiliently yieldable, such that the
5 second adapter engagement member and the handle engagement member may be snapped into pivotable engagement with each other.

The carrier engagement member of the razor blade carrier may comprise one or more claws, and the first adapter engagement member may comprise an elongated projection. Alternatively, the carrier engagement member may comprise one or more
10 slots, and the first adapter engagement member may comprise one or more tabs.

The second adapter engagement member of the adapter unit may be detachable or non-detachable from the handle engagement member. Moreover, the handle engagement member may comprise a projection with a rounded end, and the adapter engagement member may comprise a socket for receiving the projection. Preferably, the socket
15 comprises a plurality of resilient fingers.

In yet another preferred embodiment, there is provided a razor cartridge for use with a razor handle having a handle engagement member extending from one end thereof. The razor cartridge includes a razor blade carrier having first and second carrier engagement members thereon. The second carrier engagement member is pivotably
20 engageable with the handle engagement member. The razor cartridge also includes an adapter unit having a first side and a second side, the first side having an adapter engagement member lockingly mateable with the first carrier engagement member, with at least one of the adapter engagement member and the first carrier engagement member being resiliently yieldable, such that the adapter engagement member and the first carrier
25 engagement member may be snapped into non-detachable engagement with each other. The second side of the adapter unit has an aperture for guiding the handle engagement member into pivotable engagement with the second carrier engagement member.

The first carrier engagement member may comprise one or more claws, and the adapter engagement member may comprise an elongated projection. In addition, the first

carrier engagement member may comprise one or more slots, and the adapter engagement member may comprise one or more tabs. Preferably, the aperture comprises tapered inner walls.

In each of the embodiments described above, the razor handle may have a central, projecting tongue, and the adapter unit may have a socket for loosely receiving the tongue, such that when the handle and the adapter unit are engaged, the central, projecting tongue and the socket cooperate to limit the pivoting range of the handle with respect to the razor cartridge.

The adapter unit of the present invention may advantageously be an injection-molded, plastic piece.

In accordance with another aspect of the present invention, there is provided a method of manufacturing razor cartridges for use with a first razor handle and a second razor handle. The method includes the steps of manufacturing first and second substantially identical razor blade carriers having substantially identical first and second carrier engagement members thereon, respectively; manufacturing a first adapter unit having two sides, a first side having a first adapter engagement member mateable with the first carrier engagement member, with at least one of the first adapter engagement member and the first carrier engagement member being resiliently yieldable, and a second side having means for attachably mating the first razor blade carrier with the first razor handle; and manufacturing a second adapter unit having two sides, a first side having a second adapter engagement member mateable with the second carrier engagement member, with at least one of the second adapter engagement member and the second carrier engagement member being resiliently yieldable, and a second side having means for attachably mating the second razor blade carrier with the second razor handle.

Preferably, the method also includes the steps of forming a first razor cartridge for use with the first razor handle by engaging the first adapter unit with the first razor blade carrier through the resiliently yieldable cooperation of the first adapter engagement member with the first carrier engagement member and forming a second razor cartridge for use with the second razor handle by engaging the second adapter unit with the second

razor blade carrier through the resiliently yieldable cooperation of the second adapter engagement member with the second carrier engagement member.

In accordance with another aspect of the present invention, there is also provided a method of manufacturing razor handles for use with a first razor blade carrier and a second razor blade carrier. The first razor blade carrier has a first carrier engagement member thereon, and the second razor blade carrier has a second carrier engagement member thereon. First, the method includes the step of manufacturing first and second substantially identical razor handles having substantially identical first and second handle engagement members thereon, respectively. Second, the method includes the step of manufacturing a first adapter unit having two sides, a first side having a first adapter engagement member mateable with the first handle engagement member, with at least one of the first adapter engagement member and the first handle engagement member being resiliently yieldable, and a second side having a second adapter engagement member mateable with the first carrier engagement member, with at least one of the second adapter engagement member and the first carrier engagement member being resiliently yieldable. Third, the method includes the step of manufacturing a second adapter unit having two sides, a first side having a third adapter engagement member mateable with the second handle engagement member, with at least one of the third adapter engagement member and the second handle engagement member being resiliently yieldable, and a second side having a fourth adapter engagement member mateable with the second carrier engagement member, with at least one of the fourth adapter engagement member and the second carrier engagement member being resiliently yieldable. Preferably, the method also includes the steps of engaging the first adapter unit with the first razor handle through the resiliently yieldable cooperation of the first adapter engagement member with the first handle engagement member and engaging the second adapter unit with the second handle through the resiliently yieldable cooperation of the third adapter engagement member with the second handle engagement member.

BRIEF DESCRIPTION OF THE DRAWINGS

Figs. 1 and 2 are isometric views of an adapter unit according to a preferred embodiment of the present invention;

Figs. 3 and 4 are exploded isometric views of a shaving razor including the adapter unit according to the preferred embodiment of Figs. 1 and 2;

Figs. 5 and 6 are isometric views of the shaving razor of Figs. 3 and 4 with the razor blade carrier, adapter unit, and handle engaged;

Figs. 7 and 8 are isometric views of an adapter unit according to another preferred embodiment of the present invention;

Fig. 9 is an exploded isometric view of a shaving razor including the adapter unit according to the preferred embodiment of Figs. 7 and 8;

Fig. 10 is an isometric view of the shaving razor of Fig. 9, with the razor blade carrier, adapter unit, and handle engaged;

Figs. 11 and 12 are exploded side views of a shaving razor including the adapter unit according to the preferred embodiment of Figs. 7 and 8;

Figs. 13 and 14 are isometric views of an adapter unit according to another preferred embodiment of the present invention; and

Fig. 15 is an exploded isometric view of a shaving razor including the adapter unit according to the preferred embodiment of Figs. 13 and 14.

DETAILED DESCRIPTION

Figs. 1 and 2 show isometric views of an adapter unit 10 according to a first preferred embodiment of the present invention. The adapter unit 10 includes an elongated, generally rectangular base 12 having a bottom side 14a and a top side 14b.

The bottom side 14a includes two groups of resilient fingers 16a and 16b disposed on opposite ends of the longitudinal axis of the base 12. The two groups of resilient fingers 16a and 16b form the boundaries of two spherically-shaped cavities 26a and 26b, respectively. Depending on the position and size of the spherically-shaped cavities 26a and 26b, the bottom side 14a may include rounded depressions further delineating the

boundaries of the spherically-shaped cavities. As shown in the figures, four resilient fingers for each group is preferred, but any number of fingers operable to form the boundaries of a spherically-shaped cavity may be used. The bottom side 14a also includes a central socket 18. The central socket 18 includes a notch 20 running
5 perpendicular to the plane of the bottom side 14a.

The top side 14b includes projections extending outwardly from its longitudinal edges. Along the length of one longitudinal edge of top side 14b, there is disposed an elongated projection 22. Along the other longitudinal edge of top side 14b, there are disposed a pair of projecting tabs 24a and 24b, as shown in Fig. 2. Referring to Fig. 2,
10 the tabs 24a and 24b are disposed on opposite ends of the longitudinal axis of the base 12. The top side 14b also includes a pair of projections 28a and 28b extending from the top side 14b and running perpendicular to the longitudinal edges of top side 14b.

Figs. 3 to 6 show isometric views of a shaving razor including a standardized razor blade carrier 30, the adapter unit 10 of Figs. 1 and 2, and a razor handle end 50. In
15 Figs. 3 and 4, the shaving razor is shown before engagement of the razor blade carrier 30, adapter unit 10, and razor handle end 50. In Figs. 5 and 6, the shaving razor is shown with the razor blade carrier 30, adapter unit 10, and handle end 50 engaged together.

As shown in these figures, the razor blade carrier 30 is an elongated, generally rectangular structure. The axis of elongation is parallel to the cutting edge of the razor
20 blade or blades contained in the razor blade carrier (blades not shown). The razor blade carrier 30 may include any of the blade, guard, and cap features that are well-known in the art (not shown). Referring to Fig. 3, the razor blade carrier 30 includes a bottom base 32 with a resilient lip 44 formed around it. In the center of the base 32, a plateau-like projection 34 extends from the base 32. The plateau-like projection 34 is shaped to fit in
25 between the projections 28a and 28b on the adapter unit 10.

On either side of the plateau-like projection 34, a pair of support structures 40a and 40b extend from the base 32. As best shown in Fig. 3, a plurality of claws 36 are disposed on the lip 44 along one of the longitudinal sides of the razor blade carrier 30. As best shown in Fig. 4, a pair of slots 38a and 38b are formed in the support structures

40a and 40b, respectively, on the side of the razor blade carrier 30 opposite from the claws 36. Referring to Figs. 3 and 4, the standardized razor blade carrier 30 also includes a pair of cylindrical shafts 42a and 42b formed in the support structures 40a and 40b, respectively, which together define a pivot axis for the razor blade carrier 30 for certain
5 handle designs. The cylindrical shafts 42a and 42b are not utilized in the embodiment of Figs. 3 to 6, but will be utilized in a later embodiment.

In the embodiment of Figs. 3 to 6, the razor handle end 50 is bifurcated into two arms 54a and 54b, which form a V-shape. The two arms 54a and 54b are joined at their outer ends by a bridge portion 62. Each arm 54a and 54b includes a ball-like projection
10 56a and 56b, respectively, at its end. The bridge portion 62 includes a central, projecting tongue 58, which is T-shaped in cross-section.

To engage the adapter unit 10 with the razor blade carrier 30, the tabs 24a and 24b of the adapter unit 10 are placed within the slots 38a and 38b, respectively, of the razor blade carrier 30. The adapter unit 10 is then pivoted about the longitudinal edge on
15 which the tabs 24a and 24b are located until the elongated projection 22 contacts the claws 36. Pressure is then exerted on the adapter unit 10 so that, by camming action of the elongated projection 22 on the claws 36, the claws 36 and the lip 44 are pushed outwardly. After the elongated projection 22 has passed the claws 36, the claws 36 and the lip 44 return to their original positions, thus locking the adapter unit 10 into the razor
20 blade carrier 30, and thereby forming a razor cartridge. During this procedure, the plateau-like projection 34 of the razor blade carrier 30 cooperates with the projections 28a and 28b of the adapter unit 10 to guide and stabilize the adapter unit 10 into position.

It will be seen that once the adapter unit 10 is engaged with the razor blade carrier 30, the adapter unit 10 permits the razor cartridge formed thereby to be engaged with the
25 handle end 50 by snapping the ball-like projections 56a and 56b of the handle end 50 into the spherical cavities 26a and 26b formed by the groups of resilient fingers 16a and 16b, respectively, of the adapter unit 10. Once engaged, the ball-like projections 56a and 56b and the groups of resilient fingers 16a and 16b form a pair of ball-and-socket joints. In addition, the tongue 58 of the handle end 50 fits into the socket 18 of the adapter unit 10,

with the T-shape of the tongue 58 cooperating with the notch 20 of the socket 18 to guide the razor handle end 50 into the adapter unit 10 in the correct orientation for shaving. Preferably, the socket 18 is slightly wider than the tongue 58 leaving room for play between the tongue 58 and the socket 18 so that the razor cartridge, consisting of the razor blade carrier 30 and the adapter unit 10, may be pivoted on the ball-and-socket joints. The play between the socket 18 and the tongue 58 determines the pivot range of the razor cartridge.

Figs. 7 and 8 show isometric views of an adapter unit 110 according to a second preferred embodiment of the present invention. The adapter unit 110 includes an elongated, generally rectangular base 112 having a bottom side 114a and a top side 114b.

With reference to Fig. 7, the bottom side 114a includes two pairs of resilient fingers 116a and 116b disposed on opposite ends of the longitudinal axis of the base 112. Each pair of resilient fingers 116a and 116b are adapted to receive a cylindrically shaped structure. The bottom side 114a also includes a central socket 118. The central socket 118 includes a notch 120 running perpendicular to the plane of the bottom side 114a.

With reference to Fig. 8, the top side 114b of the adapter unit 110 includes projections extending outwardly from its longitudinal edges. Running along the length of one longitudinal edge, an elongated projection 122 is disposed on the top side 114b. On the opposite longitudinal edge, there are disposed a pair of projecting tabs 124a and 124b. The top side 114b also includes a pair of projections 128a and 128b extending from the top side 114b and running perpendicular to the longitudinal edges of the top side 114b.

Figs. 9 and 10 show exploded and assembled isometric views, respectively, of a shaving razor including the standardized razor blade carrier 30 previously described with regard to the embodiment of Figs. 3 to 6, the adapter unit 110 of Figs. 7 and 8, and a razor handle end 150. Figs. 11 and 12 show exploded side views of the same shaving razor.

As shown in Figs. 9 to 12, the handle end 150 is bifurcated into two arms 154a and 154b, which form a V-shape. The two arms 154a and 154b are joined at their outer ends by a bridge portion 162. The arms 154a and 154b include recesses 160a and 160b,

respectively, at their ends. The recesses 160a and 160b include therein cylindrically shaped portions 156a and 156b, respectively. The bridge portion 162 includes a central, projecting tongue 158, which is T-shaped in cross-section.

It will be seen that the projections on the top side 114b of the adapter unit 110 are
5 similar to those of the adapter unit 10 of Figs. 1 to 6. Thus, the adapter unit 110 is engaged to the standardized razor blade carrier 30 in the same manner as has been described with respect to the adapter unit 10 to thereby form a razor cartridge. The handle end 150 is engaged with the adapter unit 110 by snap fitting the rounded portions 156a and 156b into the two pairs of resilient fingers 116a and 116b, respectively. As in
10 the prior embodiment of the present invention, the tongue 158 fits into the socket 118, with the T-shape of the tongue 158 cooperating with the notch 120 of the socket 118 to guide the handle end 150 into the adapter unit 110 in the correct orientation for shaving. Preferably, the socket 118 is slightly wider than the tongue 158 leaving room for play between the tongue 158 and the socket 118 so that the razor cartridge may be pivoted
15 about the cylindrically shaped portions 160a and 160b. The play between the socket 118 and the tongue 158 determines the pivot range of the razor cartridge formed by the adapter unit 110 and the razor blade carrier 30.

Figs. 13 and 14 show isometric views of an adapter unit 210 according to a third preferred embodiment of the present invention. The adapter unit 210 includes an
20 elongated, generally rectangular base 212 having a bottom side 214a and a top side 214b.

With reference to Fig. 13, the bottom side 214a includes a pair of guiding structures 216a and 216b disposed at opposite ends of the longitudinal axis of the base 212. The guiding structures 216a and 216b are generally rectangular structures with central openings 226a and 226b, respectively, and inner walls that taper towards the
25 central openings. The bottom side 214a also contains a pair of extending tapered projections 215a and 215b, located between the guiding structures 216a and 216b.

With reference to Fig. 14, the top side 214b includes projections that extend outwardly from its longitudinal edges. Extending outwardly along one longitudinal edge of the top side 214b, there are disposed a pair of elongated projections 222a and 222b.

On the opposite longitudinal edge, a pair of projecting tabs 224a and 224b are disposed on the top side 214b. The top side 214b also includes a pair of projections 228a and 228b extending therefrom and running perpendicular to the longitudinal edges of the top side 214b.

5 Fig. 15 shows an isometric view of a shaving razor including the standardized razor blade carrier 30, the adapter unit 210 of Figs. 14 and 15, and a razor handle end 250. In Fig. 15, the adapter unit 210 is shown engaged with the razor blade carrier 30. The manner of engagement of the adapter unit 210 with the razor blade carrier 30 is the same as described for the prior two adapter unit embodiments 10 and 110. When the
10 adapter unit 210 and the standardized razor blade carrier 30 are engaged, the central openings 226a and 226b are aligned over the openings of the cylindrical shafts 42a and 42b (see Figs. 3 and 4), respectively, on the inside walls of the support structures 40a and 40b of the standardized razor blade carrier 30.

 The razor handle end 250 includes a main casing 255 and, extending from one end
15 of the main casing 255, two arm members 254a and 254b and a central, spring-loaded tongue 258. Extending from the sides of the main casing 255 are two buttons 253a and 253b, which are operatively coupled to the arm members 254a and 254b, in a manner well-known in the art, so as to be able to move the arm members inwardly towards each other. The arm members 254a and 254b are normally separated under spring tension
20 from one another by a distance determined by the main casing 255.

 The arm members 254a and 254b contain outwardly extending rounded pins 256a and 256b, respectively, which define a pivot axis for the handle end 250. The dimensions of the rounded pins 256a and 256b are such that they fit into the cylindrical shafts 42a and 42b of the standardized razor blade carrier 30, enabling the razor cartridge formed by
25 the standardized razor blade carrier 30 and the adapter unit 210 to pivot with respect to the handle end 250.

 To engage the razor cartridge with the handle end 250, the arm members 254a and 254b are pushed into the guiding structures 216a and 216b of the adapter unit 210. As the arm members 254a and 254b are pushed into the guiding structures 216a and 216b,

the tapered walls of the guiding structures 216a and 216b guide the rounded pins 256a and 256b into the openings of the cylindrical shafts 42a and 42b (see Figs. 3 and 4) of the razor blade carrier 30, respectively.

Once the handle end 250 and the razor cartridge are engaged, the central, spring-loaded tongue 258 cooperates with the bottom side 214a of the adapter unit 210 to bias the razor cartridge to a neutral, rest position. When the razor cartridge is pivoted, the camming action of the central tongue 258 against the bottom side 214a compresses the spring-loaded, central tongue 258 into the main casing 255. When the forces on the razor blade carrier 30 are released, the compressed, spring-loaded, central tongue 258 acts in reverse against the bottom side 214a to return the razor cartridge to its original, rest position. During the pivoting movement, the projections 215a and 215b prevent the central tongue 258 from moving side to side.

Preferably, the adapter units of the present invention are composed of plastic and are produced by a two-plate injection molding process. Preferably, the mold has a core pin that is not mechanically activated. The plastic material is preferably either polystyrene or ABS. The razor blade carriers and handles to be used with the adapter unit of the present invention can be made with any of the materials and processes that are well-known in the art for making such components.

Although the present invention has been described with reference to certain preferred embodiments, various modifications, alterations, and substitutions will be known or obvious to those skilled in the art without departing from the spirit and scope of the invention, as defined by the appended claims. For example, although the preferred embodiments as described are used to attach various handle designs to a standardized razor blade carrier, the present invention may also be used to attach a single handle design to various razor blade carriers. In addition, although the various embodiments of the adapter units have been described and shown in connection with detachable and pivotable razor handles, non-detachable and non-pivotable razor handles may also be used with the adapter units of the present invention with appropriate modifications to the engaging means. As another example, although preferred configurations of projections

and tabs have been described with regard to the engagement of the adapter units and the standardized razor blade carrier, other configurations may be used. Thus, the preferred embodiments described and illustrated are in no way intended to limit the scope of the invention, as defined by the appended claims.

CLAIMS

1. A razor cartridge for use with a razor handle having a handle engagement member extending from one end thereof, comprising:
a razor blade carrier having a carrier engagement member thereon; and
5 an adapter unit having a first side and a second side,
said first side having an adapter engagement member lockingly mateable with said carrier engagement member, with at least one of said adapter engagement member and said carrier engagement member being resiliently yieldable, such that said adapter engagement member and said carrier engagement member may be
10 snapped into non-detachable engagement with each other, and
said second side having means for attachably mating said razor cartridge with said handle engagement member.
2. The razor cartridge of claim 1, wherein said carrier engagement member comprises one or more claws, and said adapter engagement member comprises an
15 elongated projection.
3. The razor cartridge of claim 1, wherein said carrier engagement member comprises one or more slots, and said adapter engagement member comprises one or more tabs.
4. A razor cartridge for use with a razor handle having a handle engagement
20 member extending from one end thereof, comprising:
a razor blade carrier having a carrier engagement member thereon; and
an adapter unit having a first side and a second side,
said first side having a first adapter engagement member lockingly mateable with said carrier engagement member, with at least one of said first adapter

engagement member and said carrier engagement member being resiliently yieldable, such that said first adapter engagement member and said carrier engagement member may be snapped into non-detachable engagement with each other, and

- 5 said second side having a second adapter engagement member pivotably mateable with said handle engagement member, at least one of said second adapter engagement member and said handle engagement member being resiliently yieldable, such that said second adapter engagement member and said handle engagement member may be snapped into pivotable engagement with each other.

- 10 5. The razor cartridge of claim 4, wherein said carrier engagement member comprises one or more claws, and said first adapter engagement member comprises an elongated projection.

6. The razor cartridge of claim 4, wherein said carrier engagement member comprises one or more slots, and said first adapter engagement member comprises one or more tabs.

- 15 7. The razor cartridge of claim 4, wherein said second adapter engagement member is detachable from said handle engagement member.

8. The razor cartridge of claim 4, wherein said second adapter engagement member is non-detachable from said handle engagement member.

- 20 9. The razor cartridge of claim 4, wherein said handle engagement member comprises a projection with a rounded end, and said second adapter engagement member comprises a socket for receiving said projection.

10. The razor cartridge of claim 9, wherein said socket comprises a plurality of resilient fingers.

11. The razor cartridge of claim 4, wherein said handle engagement member comprises a ball-like projection, and said second adapter engagement member comprises a socket, whereby when said handle engagement member and said second adapter engagement member are engaged, said ball-like projection and said socket form a
5 pivotable ball-and-socket joint.

12. The shaving razor cartridge of claim 11, wherein said socket comprises a plurality of resilient fingers.

13. A razor cartridge for use with a razor handle having a handle engagement member extending from one end thereof, comprising:
10 a razor blade carrier having a first carrier engagement member and a second carrier engagement member thereon, said second carrier engagement member being pivotably engageable with said handle engagement member; and
an adapter unit having a first side and a second side,
said first side having an adapter engagement member lockingly mateable
15 with said first carrier engagement member, with at least one of said adapter engagement member and said first carrier engagement member being resiliently yieldable, such that said adapter engagement member and said first carrier engagement member may be snapped into non-detachable engagement with each other, and
said second side having an aperture for guiding said handle engagement
20 member into pivotable engagement with said second carrier engagement member.

14. The razor cartridge of claim 13, wherein said first carrier engagement member comprises one or more claws, and said adapter engagement member comprises an elongated projection.

15. The razor cartridge of claim 13, wherein said first carrier engagement member comprises one or more slots, and said adapter engagement member comprises one or more tabs.

16. The razor cartridge of claim 13, wherein said aperture comprises tapered
5 inner walls.

17. The razor cartridge of claim 1, 4, or 13, wherein said handle has a central, projecting tongue, and said adapter unit has a socket for loosely receiving said tongue, such that when said handle and said adapter unit are engaged, said central, projecting tongue and said socket cooperate to limit the pivoting range of said handle with respect to
10 said razor cartridge.

18. The razor cartridge of claim 1, 4, or 13, wherein said adapter unit is a plastic piece.

19. The razor cartridge of claim 1, 4, or 13, wherein said adapter unit is an injection-molded piece.

15 20. A method of manufacturing razor cartridges for use with a first razor handle and a second razor handle, said method comprising:

manufacturing first and second substantially identical razor blade carriers having substantially identical first and second carrier engagement members thereon, respectively;

20 manufacturing a first adapter unit having two sides, a first side having a first adapter engagement member mateable with said first carrier engagement member, with at least one of said first adapter engagement member and said first carrier engagement member being resiliently yieldable, and a second side having means for attachably mating said first razor blade carrier with said first razor handle; and

manufacturing a second adapter unit having two sides, a first side having a second adapter engagement member mateable with said second carrier engagement member, with at least one of said second adapter engagement member and said second carrier engagement member being resiliently yieldable, and a second side having means
5 for attachably mating said second razor blade carrier with said second razor handle.

21. The method of claim 20, further comprising the steps of forming a first razor cartridge for use with said first razor handle by engaging said first adapter unit with said first razor blade carrier through the resiliently yieldable cooperation of said first adapter engagement member with said first carrier engagement member; and forming a
10 second razor cartridge for use with said second razor handle by engaging said second adapter unit with said second razor blade carrier through the resiliently yieldable cooperation of said second adapter engagement member with said second carrier engagement member.

22. A method of manufacturing razor handles for use with a first razor blade
15 carrier and a second razor blade carrier, said first razor blade carrier having a first carrier engagement member thereon and said second razor blade carrier having a second carrier engagement member thereon, said method comprising:

manufacturing first and second substantially identical razor handles having substantially identical first and second handle engagement members thereon,
20 respectively;

manufacturing a first adapter unit having two sides, a first side having a first adapter engagement member mateable with said first handle engagement member, with at least one of said first adapter engagement member and said first handle engagement member being resiliently yieldable, and a second side having a second
25 adapter engagement member mateable with said first carrier engagement member, with at least one of said second adapter engagement member and said first carrier engagement member being resiliently yieldable; and

manufacturing a second adapter unit having two sides, a first side having a third adapter engagement member mateable with said second handle engagement member, with at least one of said third adapter engagement member and said second handle engagement member being resiliently yieldable, and a second side having a fourth adapter engagement member mateable with said second carrier engagement member, with
5 at least one of said fourth adapter engagement member and said second carrier engagement member being resiliently yieldable.

23. The method of claim 22, further comprising the steps of engaging said first adapter unit with said first razor handle through the resiliently yieldable cooperation of
10 said first adapter engagement member with said first handle engagement member; and engaging said second adapter unit with said second handle through the resiliently yieldable cooperation of said third adapter engagement member with said second handle engagement member.

24. An adapter unit for attachably mating a razor blade carrier and a razor
15 handle, said razor blade carrier having a carrier engagement member thereon and said razor handle having a handle engagement member extending from one end thereof, said adapter unit comprising:

a base having a first side and a second side,
said first side having an adapter engagement member lockingly
20 mateable with said carrier engagement member, with at least one of said adapter engagement member and said carrier engagement member being resiliently yieldable, such that said adapter engagement member and said carrier engagement member may be snapped into non-detachable engagement with each other, and
said second side having means for attachably mating said razor
25 blade carrier with said handle engagement member.

25. An adapter unit for attachably mating a razor blade carrier and a razor handle, said razor blade carrier having a carrier engagement member thereon and said razor handle having a handle engagement member extending from one end thereof, said adapter unit comprising:

5 a base having a first side and a second side,
 said first side having a first adapter engagement member lockingly mateable with said carrier engagement member, with at least one of said first adapter engagement member and said carrier engagement member being resiliently yieldable, such that said first adapter engagement member and said carrier engagement member
10 may be snapped into non-detachable engagement with each other, and

 said second side having a second adapter engagement member pivotably mateable with said handle engagement member, at least one of said second adapter engagement member and said handle engagement member being resiliently yieldable, such that said second adapter engagement member and said handle engagement
15 member may be snapped into pivotable engagement with each other.

26. An adapter unit for attachably mating a razor blade carrier and a razor handle, said razor blade carrier having a first carrier engagement member and a second carrier engagement member thereon and said razor handle having a handle engagement member extending from one end thereof, said adapter unit comprising:

20 a base having a first side and a second side,
 said first side having an adapter engagement member lockingly mateable with said first carrier engagement member, with at least one of said adapter engagement member and said first carrier engagement member being resiliently yieldable, such that said adapter engagement member and said first carrier engagement
25 member may be snapped into non-detachable engagement with each other, and

 said second side having an aperture for guiding said handle engagement member into pivotable engagement with said second carrier engagement member.

AMENDED CLAIMS

[received by the International Bureau on 17 March 1999 (17.03.99);
original claims 20 and 22 amended ; remaining claims unchanged ;
(3 pages)]

15. The razor cartridge of claim 13, wherein said first carrier engagement member comprises one or more slots, and said adapter engagement member comprises one or more tabs.

16. The razor cartridge of claim 13, wherein said aperture comprises tapered
5 inner walls.

17. The razor cartridge of claim 1, 4, or 13, wherein said handle has a central, projecting tongue, and said adapter unit has a socket for loosely receiving said tongue, such that when said handle and said adapter unit are engaged, said central, projecting tongue and said socket cooperate to limit the pivoting range of said handle with respect to
10 said razor cartridge.

18. The razor cartridge of claim 1, 4, or 13, wherein said adapter unit is a plastic piece.

19. The razor cartridge of claim 1, 4, or 13, wherein said adapter unit is an injection-molded piece.

15 20. A method of manufacturing razor cartridges for use with a first razor handle and a second razor handle, said first razor handle being different from said second razor handle, said method comprising:

manufacturing first and second substantially identical razor blade carriers having substantially identical first and second carrier engagement members thereon,
20 respectively;

manufacturing a first adapter unit having two sides, a first side having a first adapter engagement member mateable with said first carrier engagement member, with at least one of said first adapter engagement member and said first carrier engagement member being resiliently yieldable, and a second side having means for

attachably mating said first razor blade carrier with said first razor handle; and

manufacturing a second adapter unit having two sides, a first side having a second adapter engagement member mateable with said second carrier engagement member, with at least one of said second adapter engagement member and said second carrier engagement member being resiliently yieldable, and a second side having means for attachably mating said second razor blade carrier with said second razor handle.

21. The method of claim 20, further comprising the steps of forming a first razor cartridge for use with said first razor handle by engaging said first adapter unit with said first razor blade carrier through the resiliently yieldable cooperation of said first adapter engagement member with said first carrier engagement member; and forming a second razor cartridge for use with said second razor handle by engaging said second adapter unit with said second razor blade carrier through the resiliently yieldable cooperation of said second adapter engagement member with said second carrier engagement member.

22. A method of manufacturing razor handles for use with a first razor blade carrier and a second razor blade carrier, said first razor blade carrier having a first carrier engagement member thereon and said second razor blade carrier having a second carrier engagement member thereon, said first carrier engagement member being different from said second carrier engagement member, said method comprising:

manufacturing first and second substantially identical razor handles having substantially identical first and second handle engagement members thereon, respectively;

manufacturing a first adapter unit having two sides, a first side having a first adapter engagement member mateable with said first handle engagement member, with at least one of said first adapter engagement member and said first handle engagement member being resiliently yieldable, and a second side having a second adapter engagement member mateable with said first carrier engagement member, with at

least one of said second adapter engagement member and said first carrier engagement member being resiliently yieldable; and

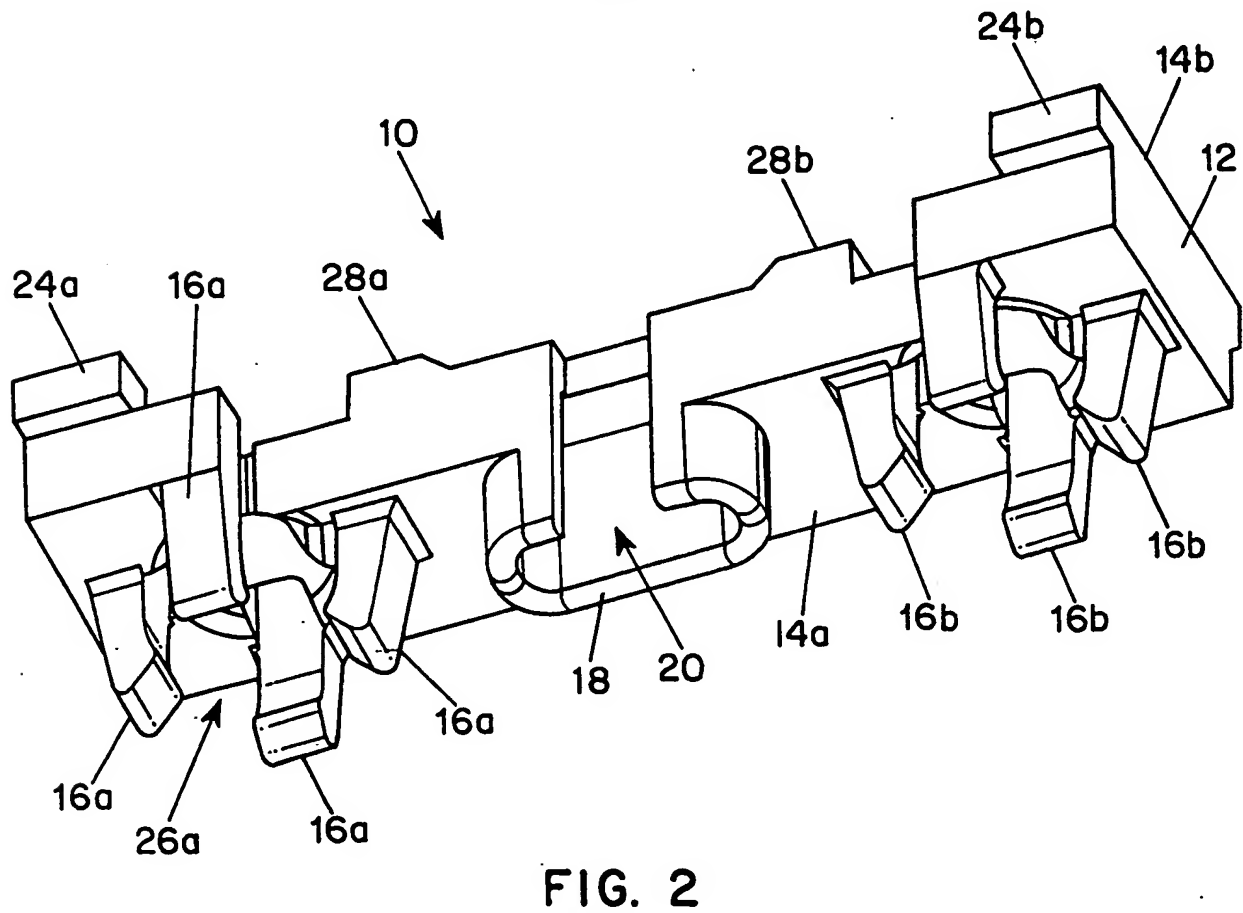
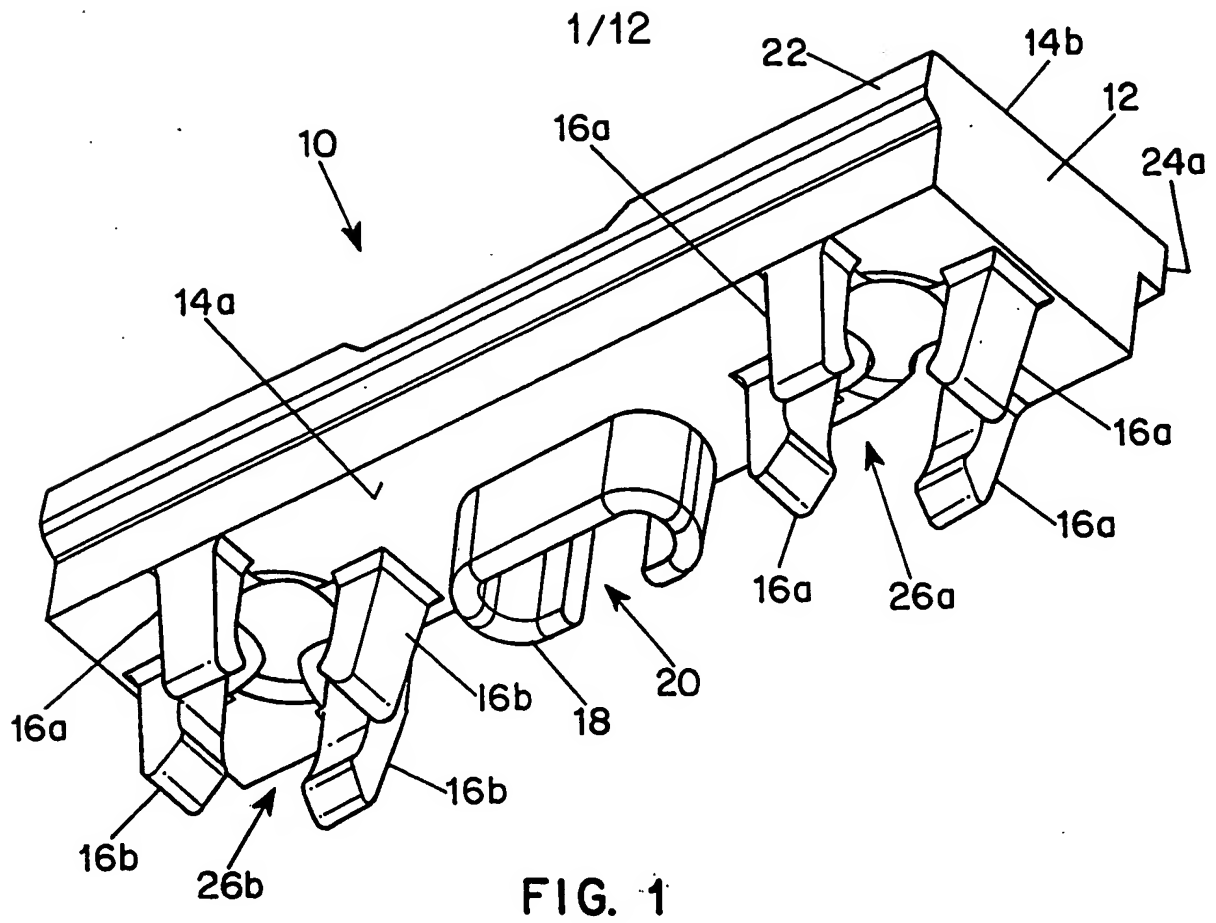
manufacturing a second adapter unit having two sides, a first side having a third adapter engagement member mateable with said second handle engagement

- 5 member, with at least one of said third adapter engagement member and said second handle engagement member being resiliently yieldable, and a second side having a fourth adapter engagement member mateable with said second carrier engagement member, with at least one of said fourth adapter engagement member and said second carrier engagement member being resiliently yieldable.

- 10 23. The method of claim 22, further comprising the steps of engaging said first adapter unit with said first razor handle through the resiliently yieldable cooperation of said first adapter engagement member with said first handle engagement member; and engaging said second adapter unit with said second handle through the resiliently yieldable cooperation of said third adapter engagement member with said second handle
- 15 engagement member.

24. An adapter unit for attachably mating a razor blade carrier and a razor handle, said razor blade carrier having a carrier engagement member thereon and said razor handle having a handle engagement member extending from one end thereof, said adapter unit comprising:

- 20 a base having a first side and a second side,
- said first side having an adapter engagement member lockingly mateable with said carrier engagement member, with at least one of said adapter engagement member and said carrier engagement member being resiliently yieldable, such that said adapter engagement member and said carrier engagement member may be
- 25 snapped into non-detachable engagement with each other, and
- said second side having means for attachably mating said razor blade carrier with said handle engagement member.



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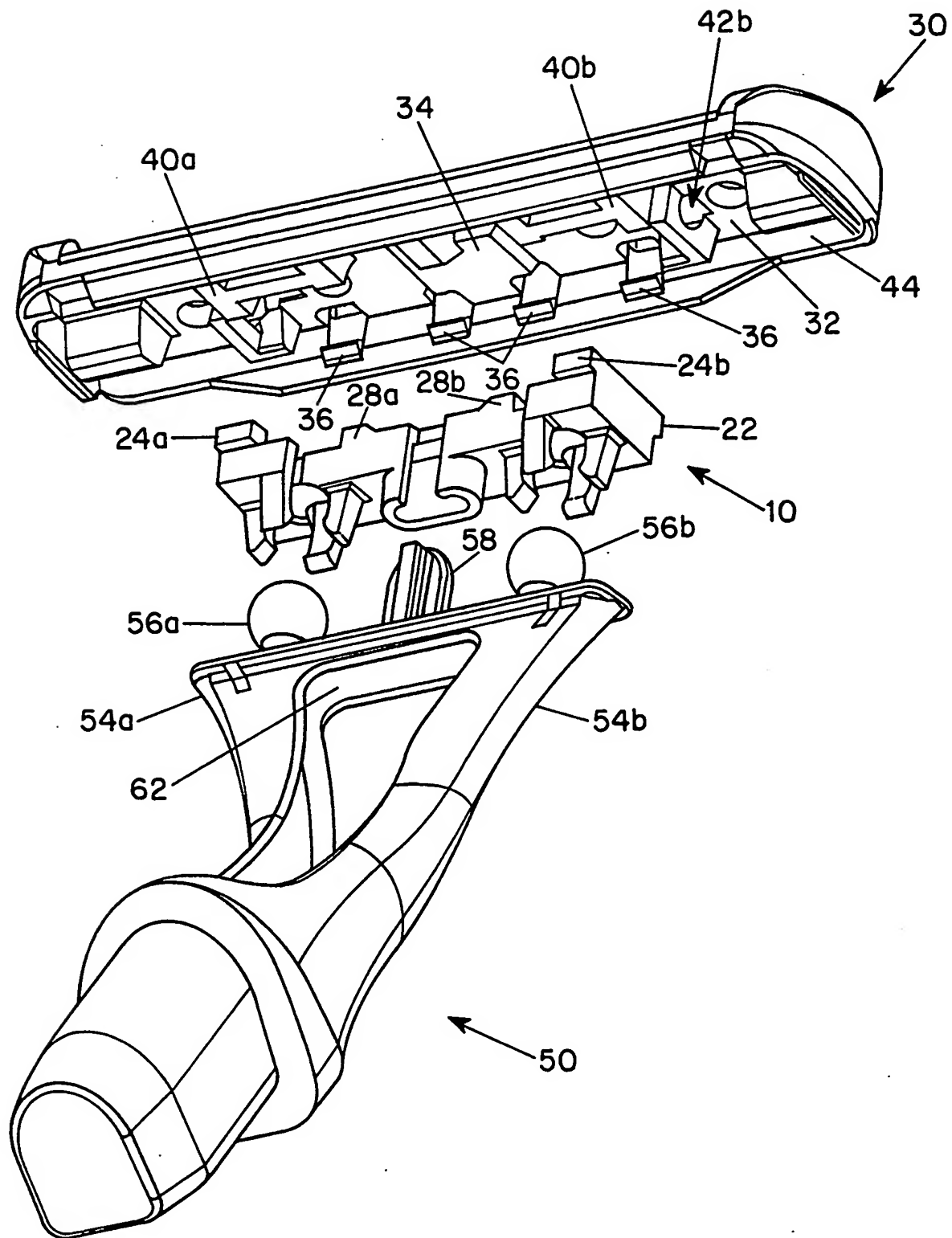


FIG. 3

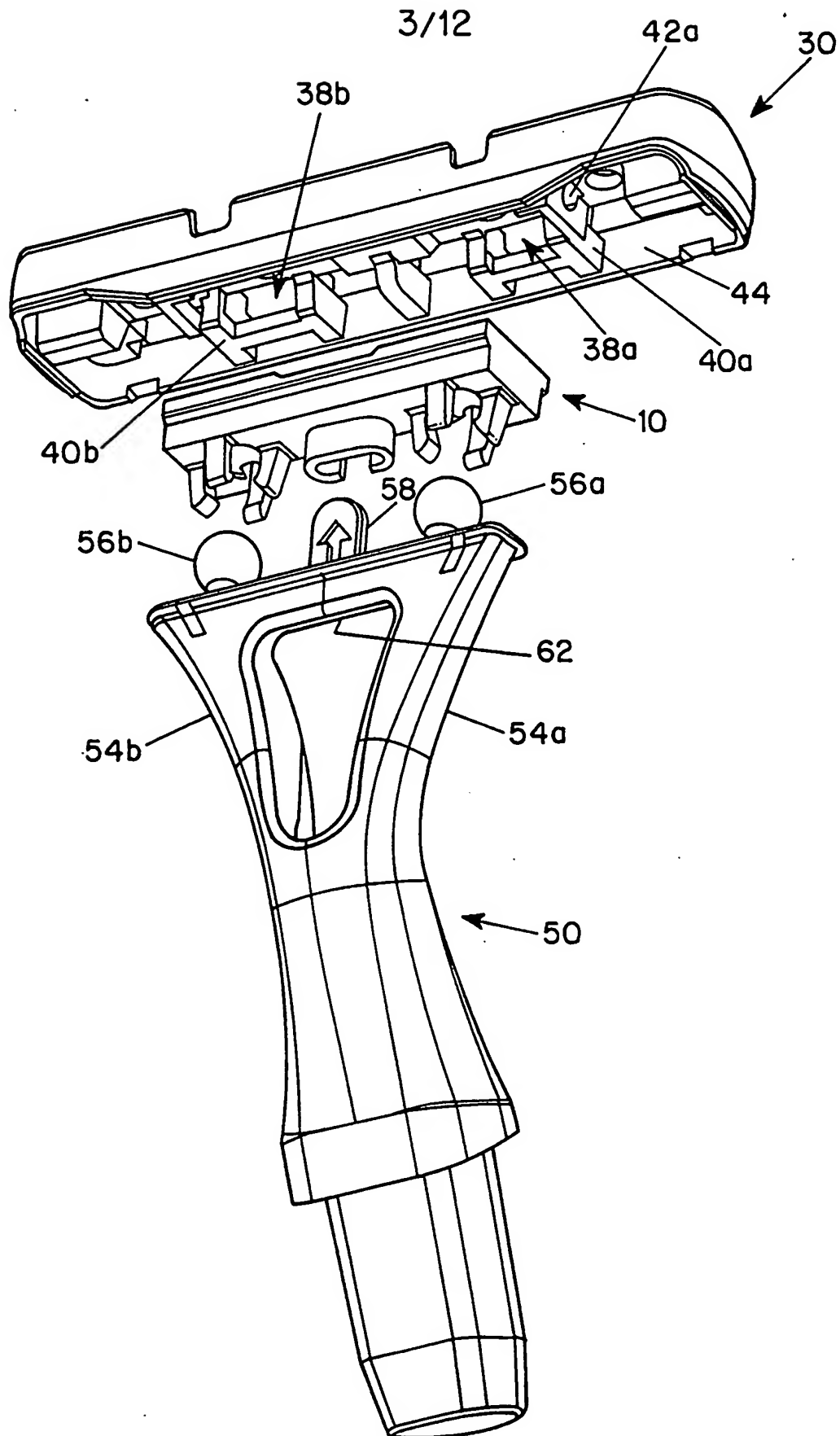


FIG. 4

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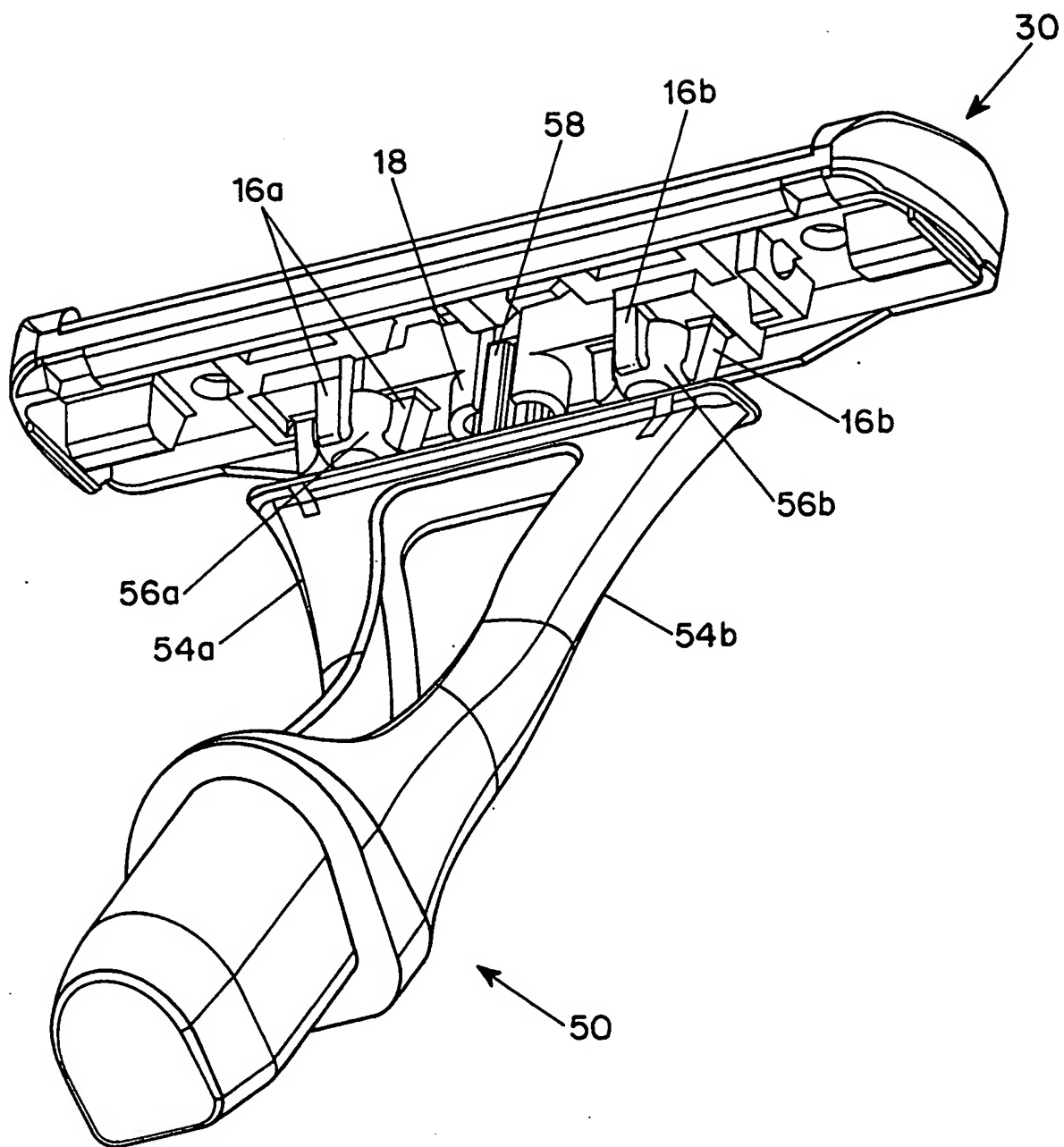


FIG. 5

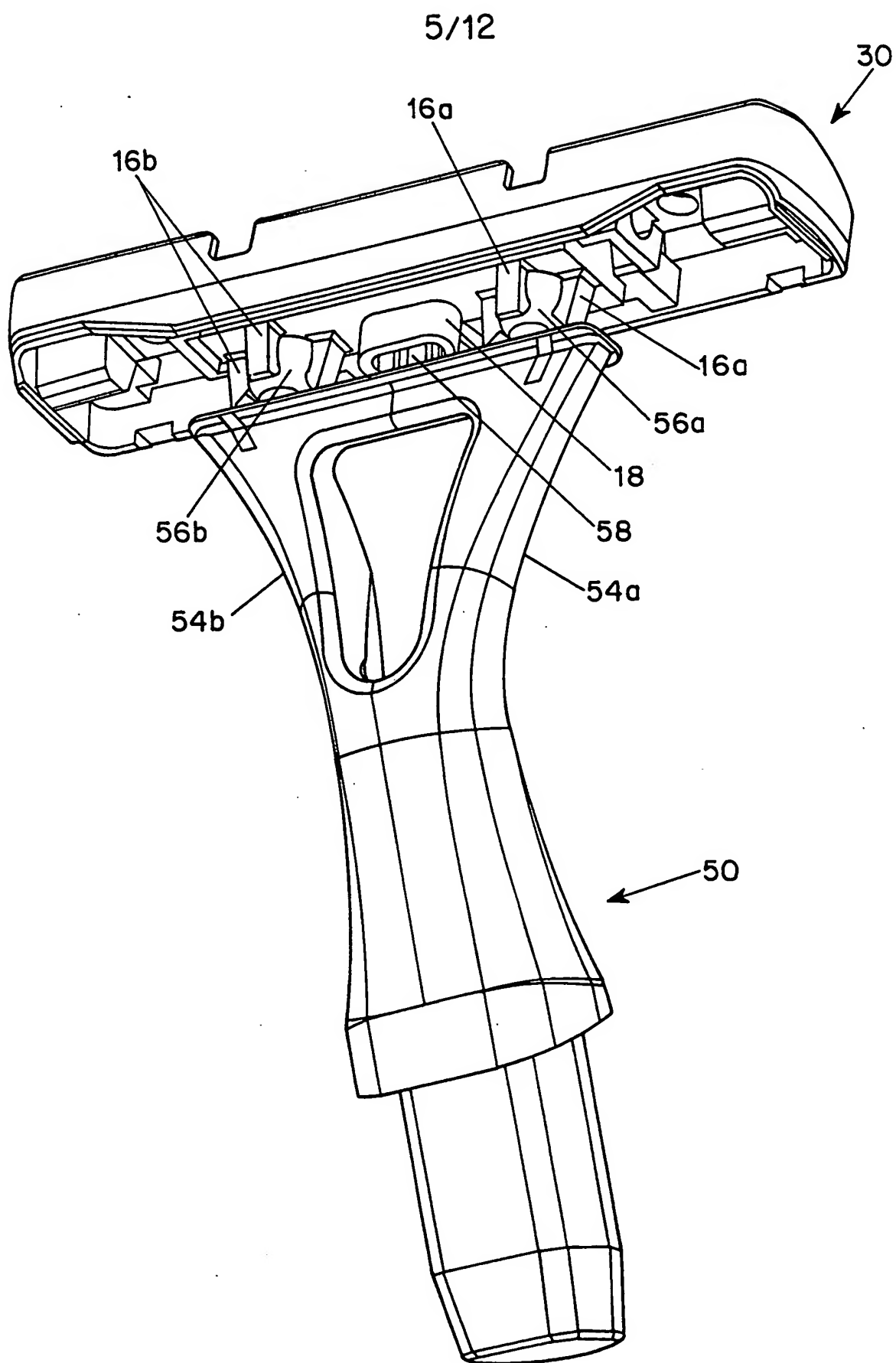


FIG. 6

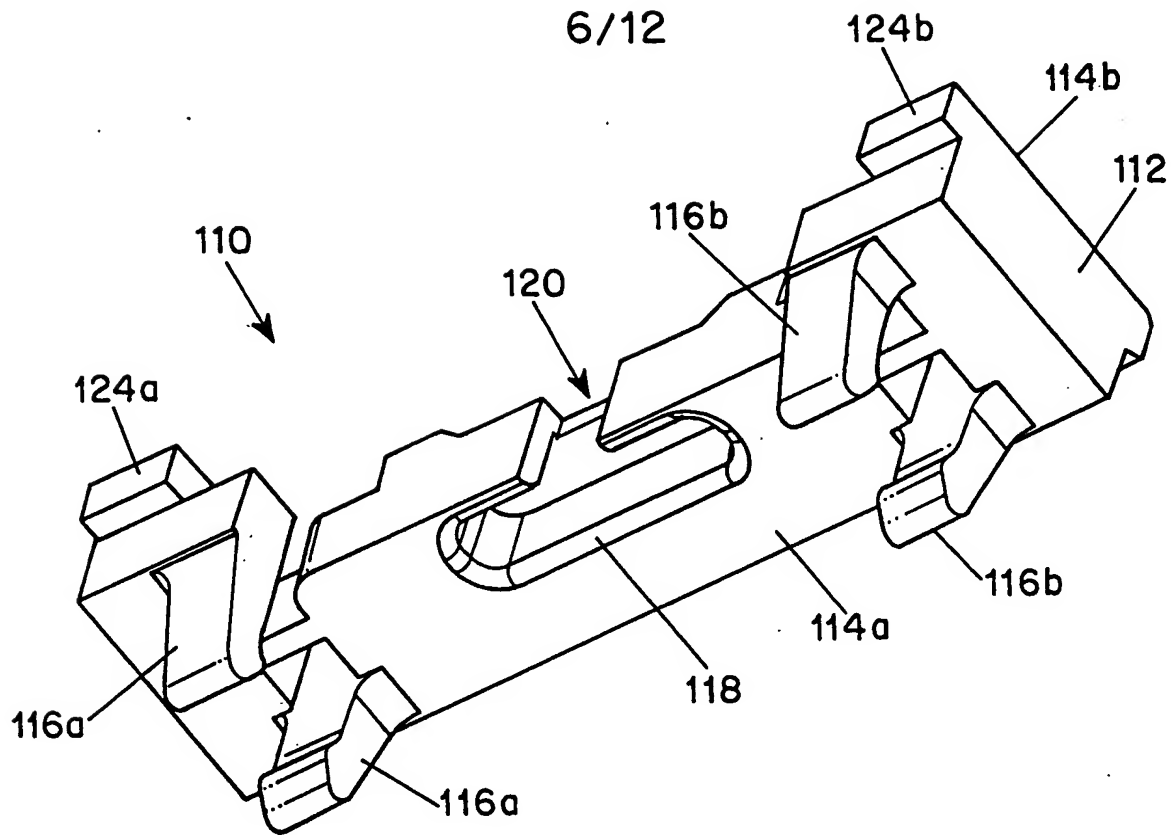


FIG. 7

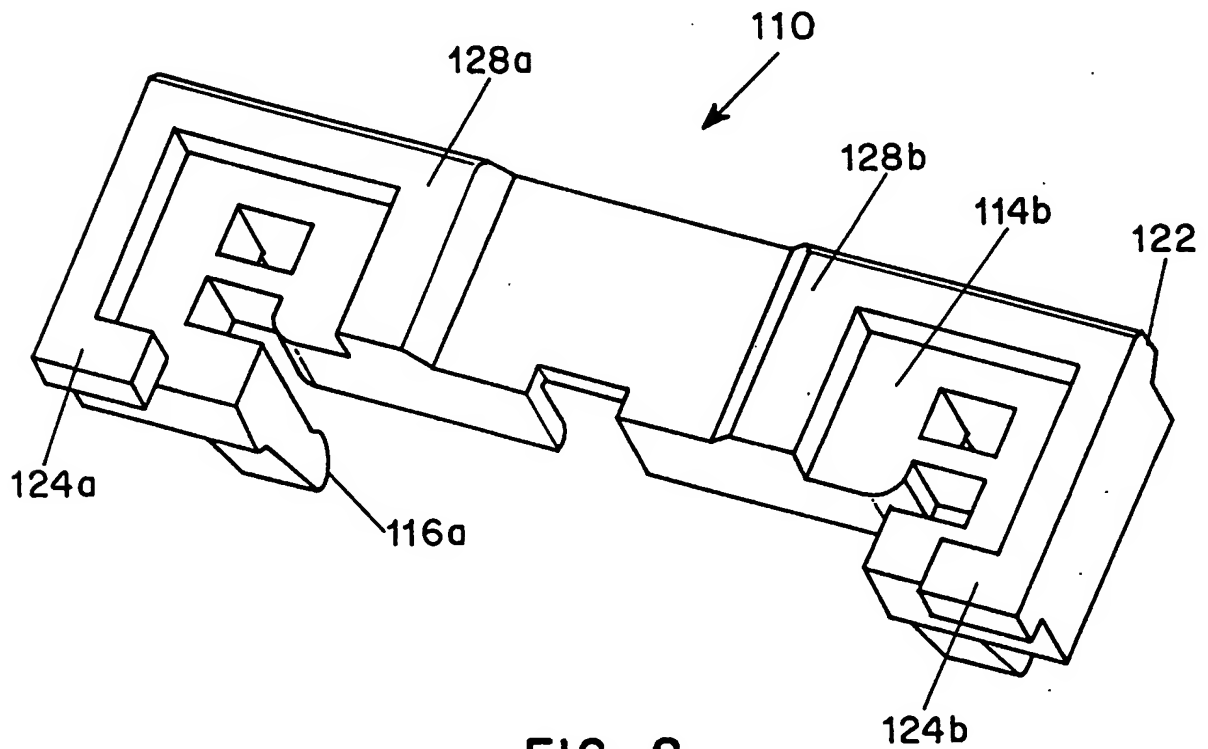


FIG. 8

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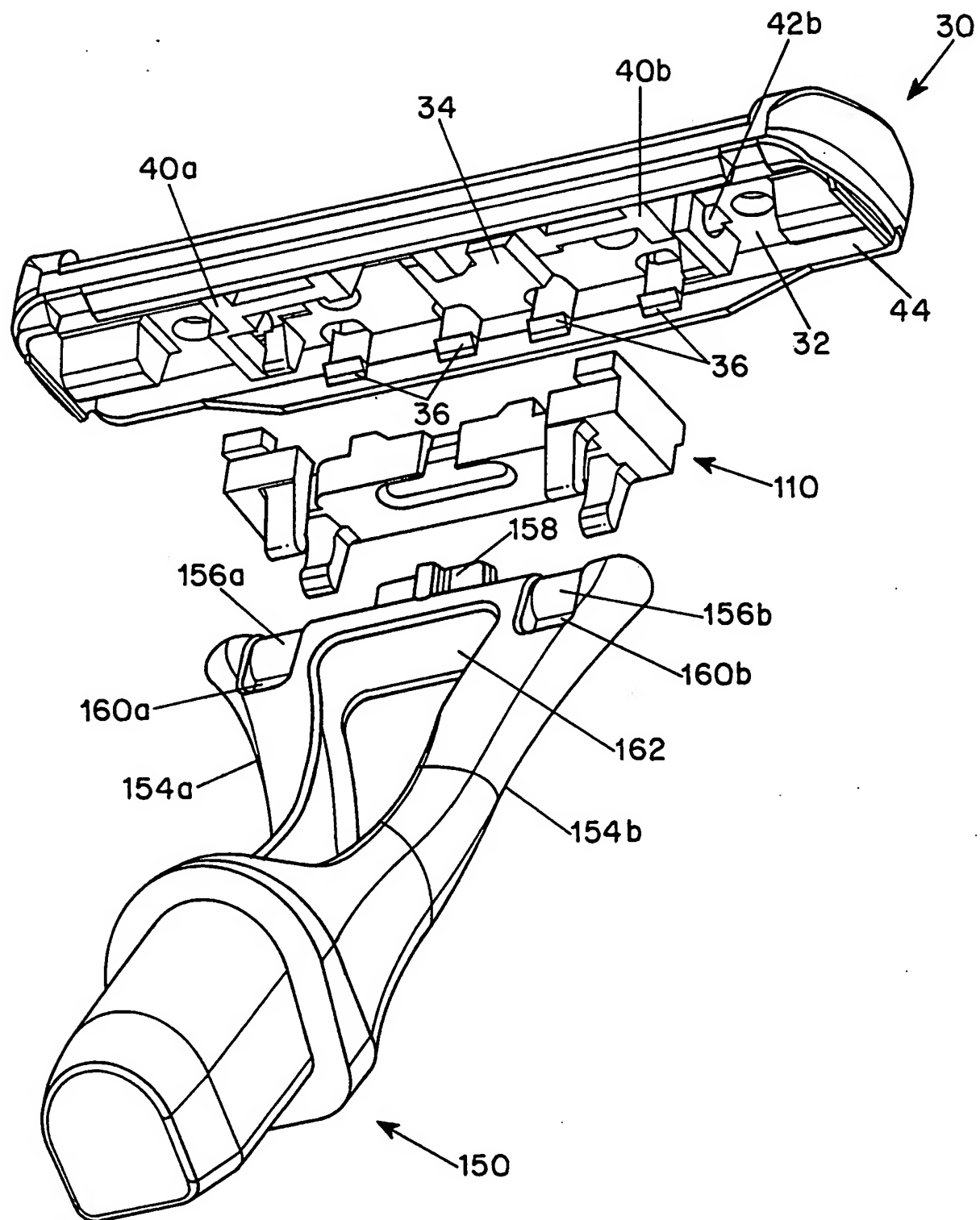


FIG. 9

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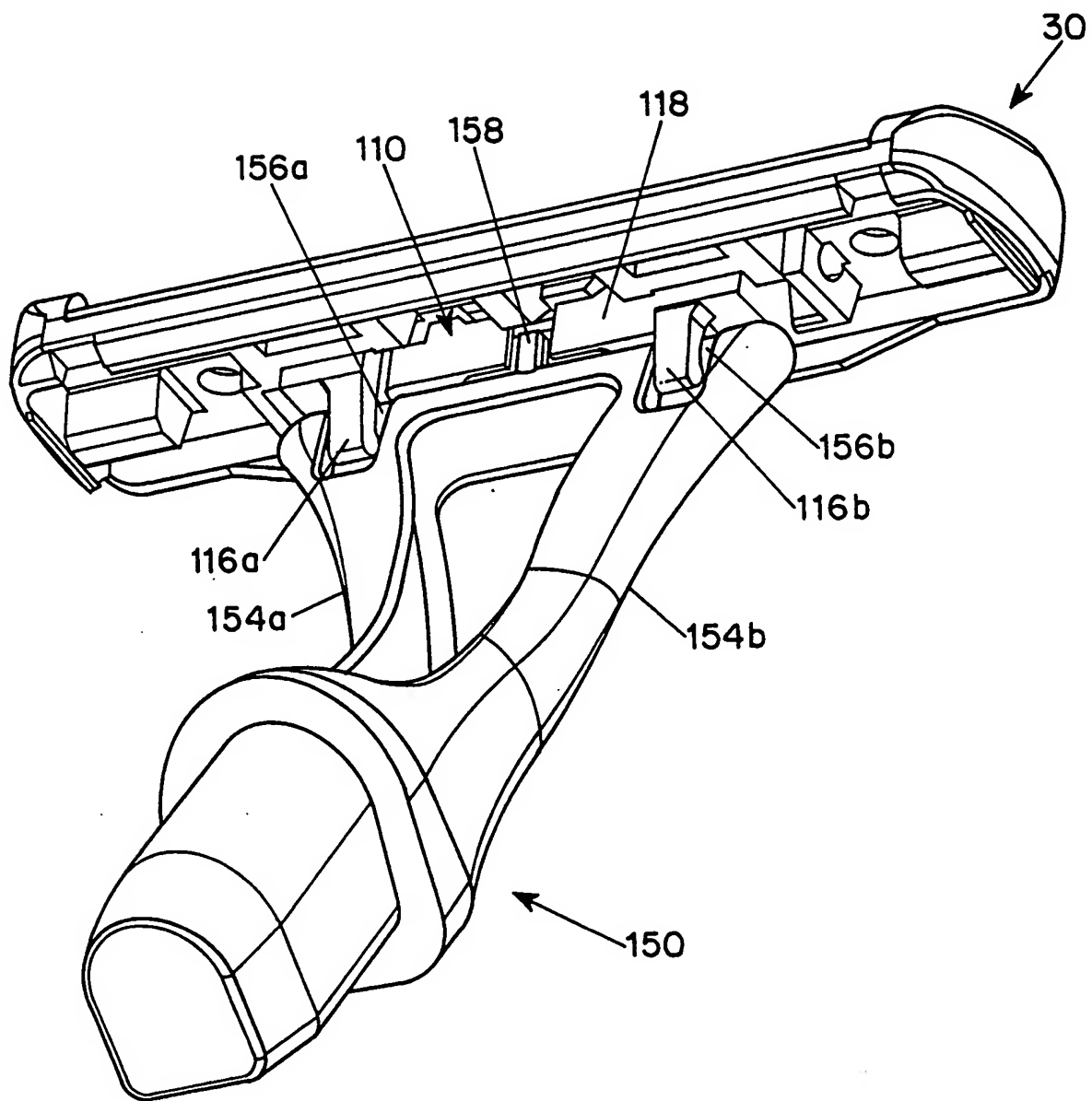


FIG. 10

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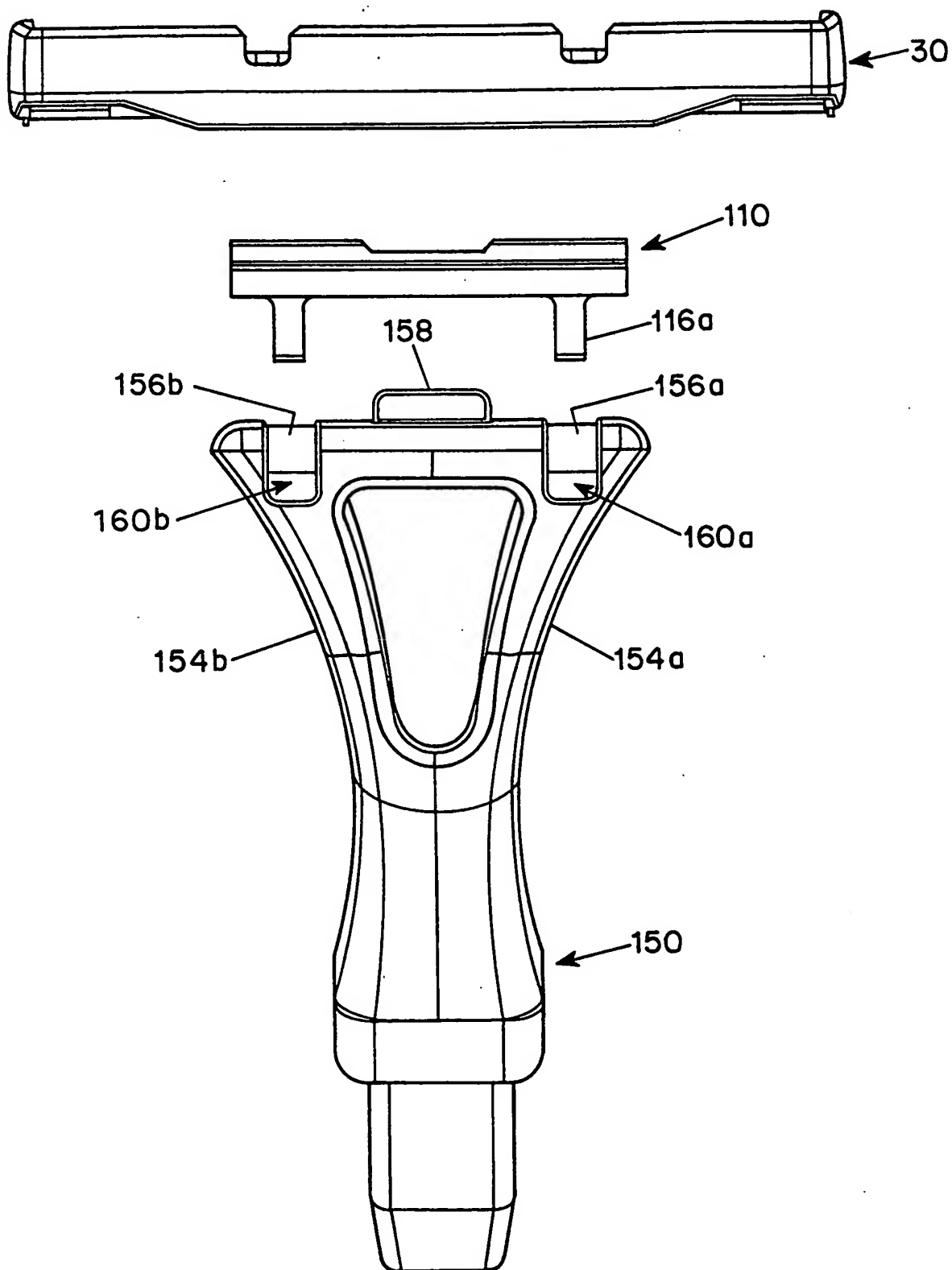


FIG. 11

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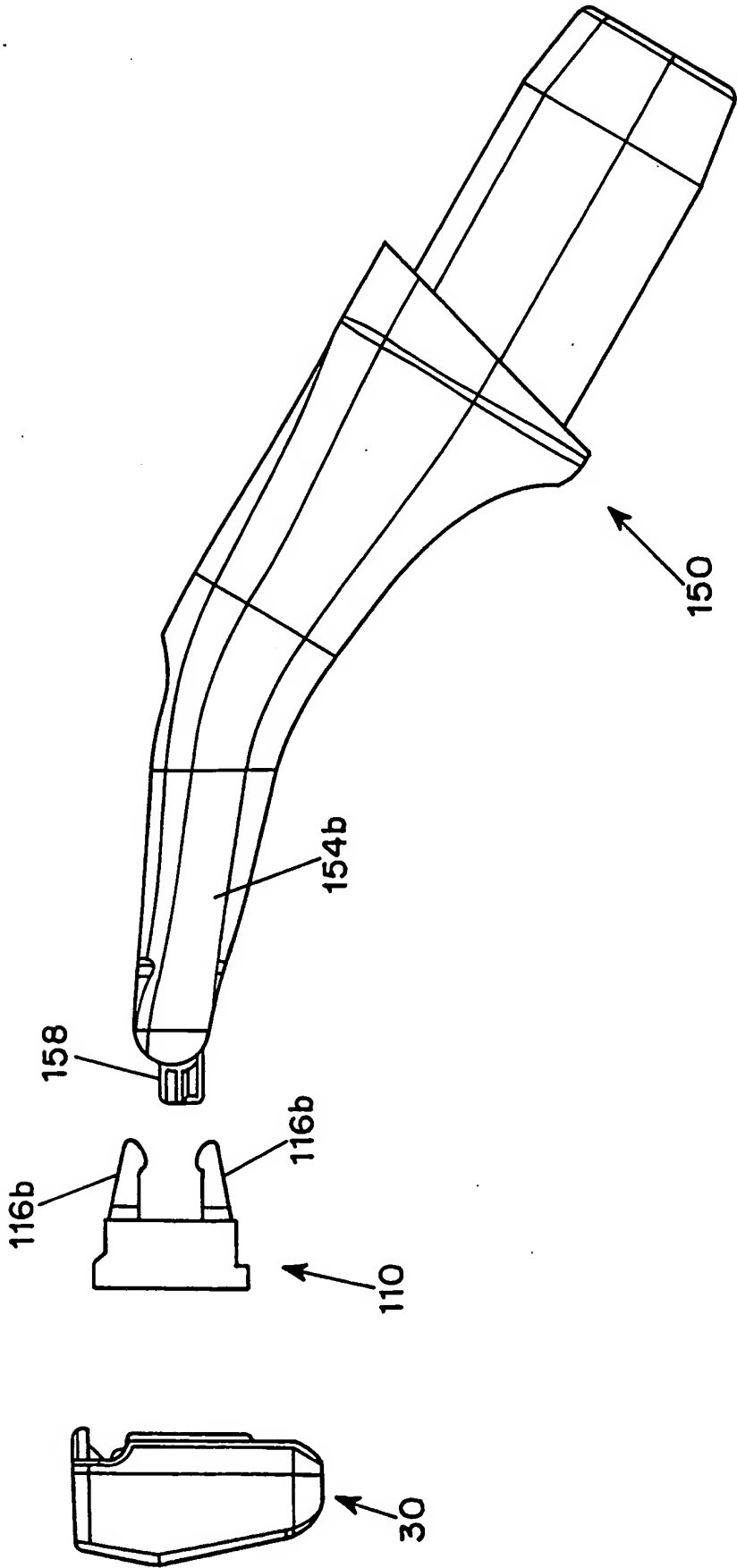
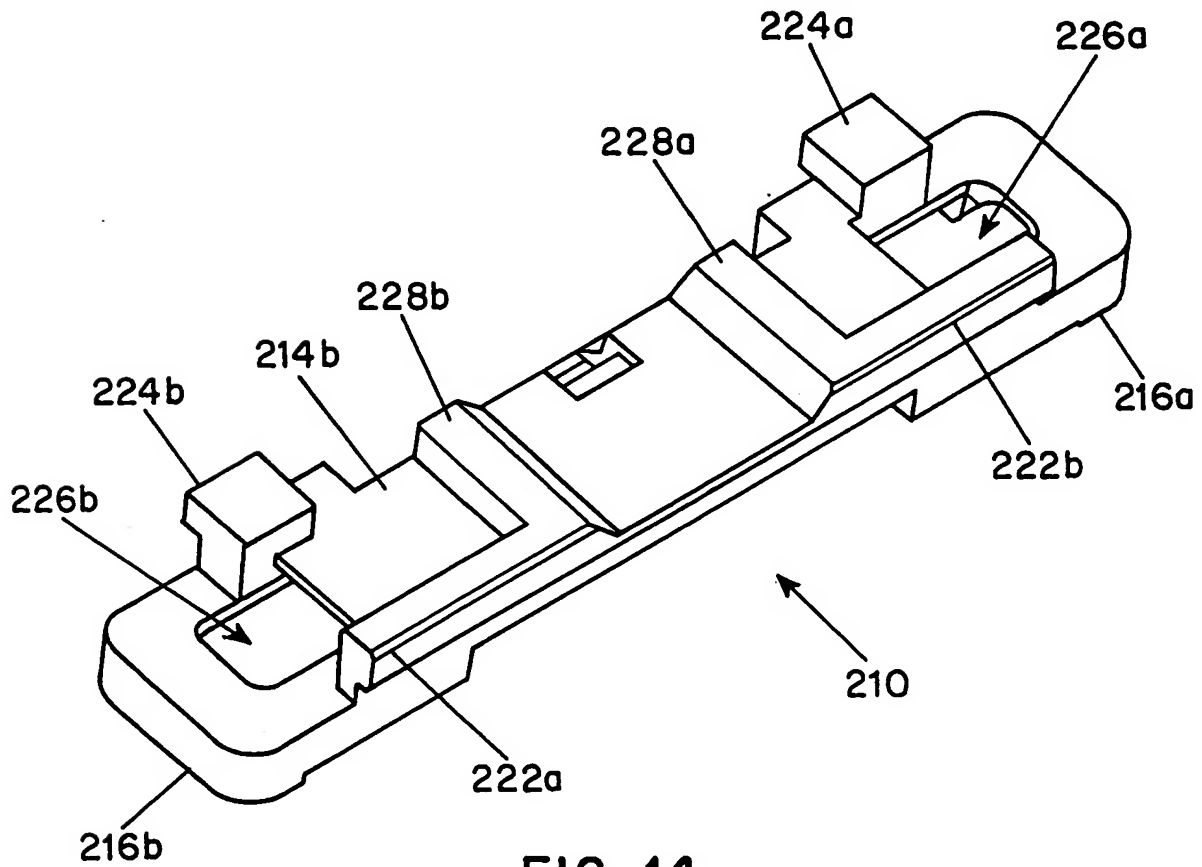
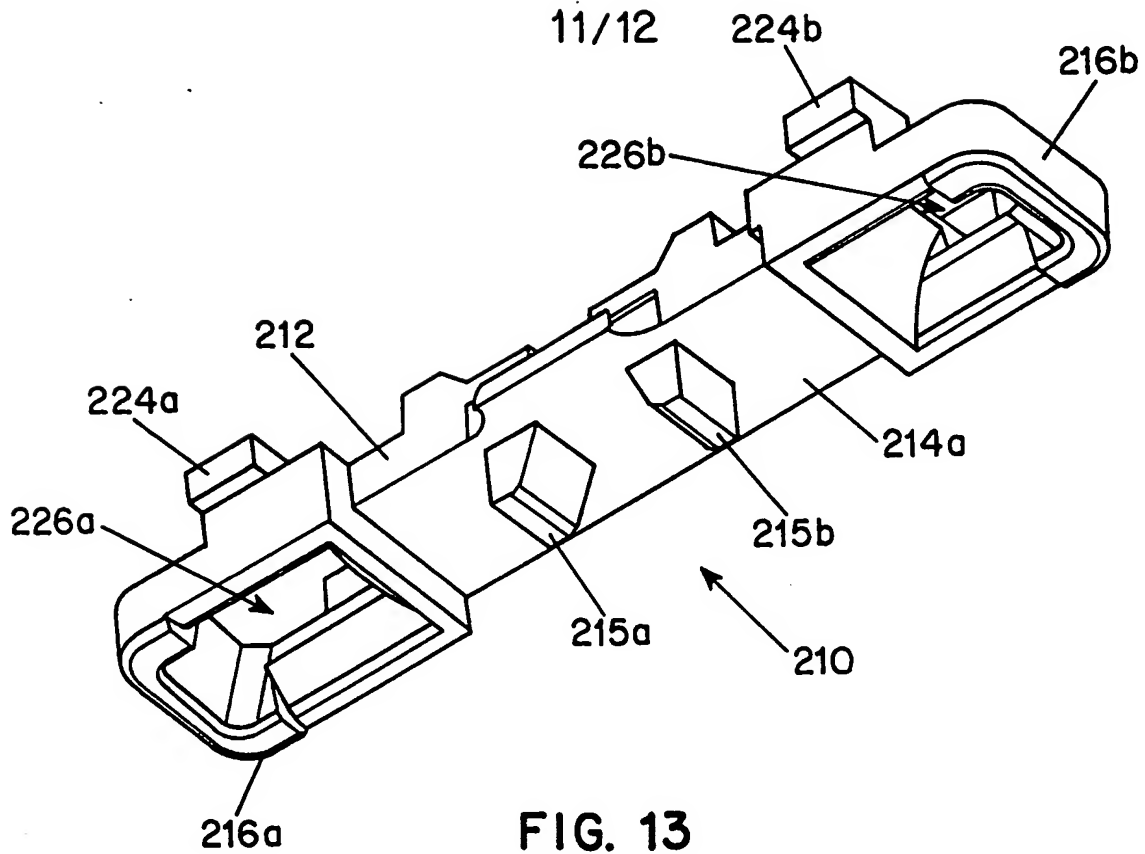


FIG. 12



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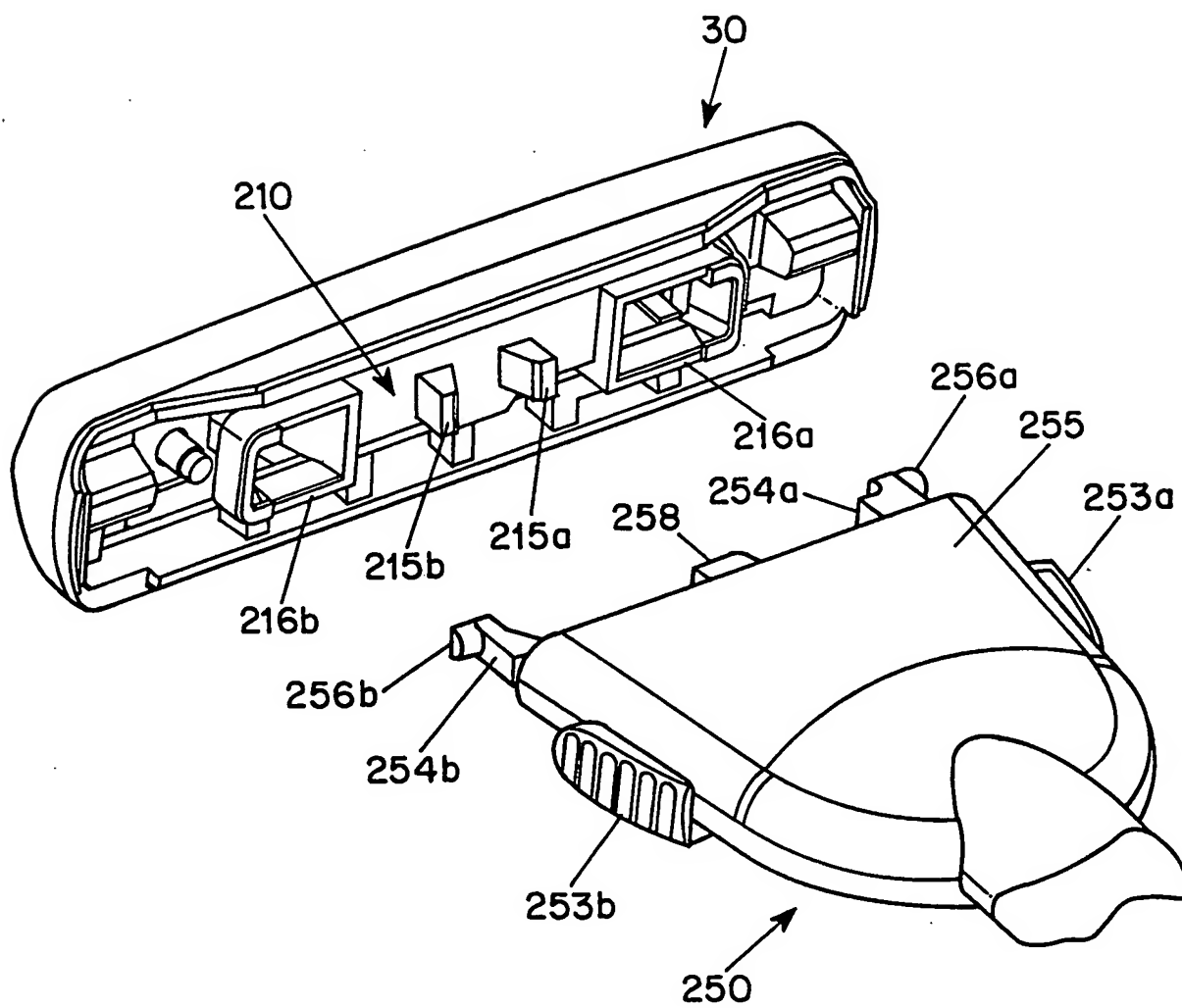


FIG. 15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/19997

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : B26B 21/08

US CL : 30/47, 50, 526, 532

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 30/47, 50, 526, 532

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,428,116 A (CHEN ET AL) 31 January 1984, Figures 1, 4-7.	1-7, 9-26
X	US 4,253,236 A (JACOBSON) 03 March 1981, Figures 1, 2, 4.	1-7, 9-12
X	US 4,932,123 A (FRANCIS) 12 June 1990, Figures 1, 4-5	1-3
Y	US 3,768,162 A (PERRY) 30 October 1973, Figures 1-2.	8
Y	US 1,092,367 A (KNAPP) 07 April 1914, Figures 1-3	11
Y	US 3,821,851 A (KUHN) 02 July 1974, Figures 1, 3-4.	11-12

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	*T	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be of particular relevance	*X*	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*A*	document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means		
P document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

04 DECEMBER 1998

Date of mailing of the international search report

14 JAN 1999

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/19997

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 1,200,426 A (KING) 03 October 1916, Figures 1, 3-4, 6-7	10
X	US 4,266,340 A (BOWMAN) 12 May 1981, Figures 1, 5-6.	1-12
Y	US 3,783,510 (A) (DAWIDOWICZ ET AL) 08 January 1974, Figure 1.	8